CLAIMS

What is claimed is:

1. A method for determining the motion of an organ, comprising the steps of:

acquiring a first set of one-dimensional motion data for an organ along a first axis by a first methodology;

acquiring a second set of one-dimensional motion data for the organ along a second axis by a second methodology, wherein the first axis and the second axis are perpendicular;

acquiring a third set of one-dimensional motion data for the organ along a third axis by a third methodology, wherein the third axis is perpendicular to the first axis and the second axis;

deriving one or more concurrent motion vectors from each of the first, second, and third sets of one-dimensional motion data; and

combining the one or more concurrent motion vectors to generate a set of three-dimensional motion data for the organ.

2. The method as recited in claim 1, wherein:

acquiring at least one set of one-dimensional motion data comprises measuring the motion along the one or more respective axes with a set of one or more sensors.

3. The method as recited in claim 1, wherein:

acquiring at least one of the first, second, and third set of one-dimensional motion data comprises validating the one or more sets of one-dimensional motion data using one or more respective sets of validation motion data.

4. The method as recited in claim 1, wherein

acquiring at least one set of one-dimensional motion data comprises determining the motion along the one or more respective axes from a respective set of motion data derived from an imager.

5. The method as recited in claim 4, wherein the respective set of motion data is derived from a set of pre-acquisition image data.

6. The method as recited in claim 4, wherein the respective set of motion data is derived from a set of acquisition image data.

7. The method as recited in claim 6, wherein the set of acquisition image data comprises a set of unreconstructed image data.

8. The method as recited in claim 6, wherein the set of acquisition image data comprises a set of reconstructed image data.

9. The method as recited in claim 1, wherein two of the first methodology, the second methodology and the third methodology comprise the same methodology.

10. The method as recited in claim 1, wherein the first methodology, the second methodology and the third methodology comprise one or more sensor-based methodologies.

11. The method as recited in claim 1, wherein the first methodology, the second methodology and the third methodology comprise one or more data-based methodologies, wherein the one or more data-based methodologies determine motion from one or more respective sets of acquisition image data.

12. The method as recited in claim 11, wherein the one or more respective sets of acquisition image data comprise one or more sets of unreconstructed image data.

13. The method as recited in claim 11, wherein the one or more respective sets of acquisition image data comprise one or more sets of reconstructed image data.

14. A computer program, provided on one or more computer readable media, for determining the motion of an organ, comprising:

a routine for acquiring a first set of one-dimensional motion data for an organ along a first axis by a first methodology;

a routine for acquiring a second set of one-dimensional motion data for the organ along a second axis by a second methodology, wherein the first axis and the second axis are perpendicular;

a routine for acquiring a third set of one-dimensional motion data for the organ along a third axis by a third methodology, wherein the third axis is perpendicular to the first axis and the second axis;

a routine for deriving one or more concurrent motion vectors from each of the first, second, and third sets of one-dimensional motion data; and

a routine for combining the one or more concurrent motion vectors to generate a set of three-dimensional motion data for the organ.

15. The computer program, as recited in claim 14, wherein:

at least one routine for acquiring at least one of the first, second, and third set of one-dimensional motion data acquires the one-dimensional motion data along the one or more respective axes from a set of one or more sensors.

16. The computer program, as recited in claim 14, wherein:

at least one routine for acquiring at least one of the first, second, and third set of one-dimensional motion data validates the one or more sets of one-dimensional motion data using one or more respective sets of validation motion data.

17. The computer program, as recited in claim 14, wherein:

at least one routine for acquiring at least one of the first, second, and third set of one-dimensional motion data determines the one-dimensional motion along the one or more respective axes from a respective set of motion data derived from an imager.

18. The computer program, as recited in claim 17, wherein the respective set of motion data is derived from a set of pre-acquisition image data.

19. The computer program as recited in claim 17, wherein the respective set of motion data is derived from a set of acquisition image data.

20. The computer program as recited in claim 19, wherein the set of acquisition image data comprises a set of unreconstructed image data.

21. The computer program as recited in claim 19, wherein the set of acquisition image data comprises a set of reconstructed image data.

22. The computer program as recited in claim 14, wherein two of the first methodology, the second methodology and the third methodology comprise the same methodology.

23. The computer program as recited in claim 14, wherein the first methodology, the second methodology and the third methodology comprise one or more sensor-based methodologies.

24. The computer program as recited in claim 14, wherein the first methodology, the second methodology and the third methodology comprise one or more data-based methodologies, wherein the one or more data-based methodologies determine motion from one or more respective sets of acquisition image data.

25. The computer program as recited in claim 24, wherein the one or more respective sets of acquisition image data comprise one or more sets of unreconstructed image data.

26. The computer program as recited in claim 24, wherein the one or more respective sets of acquisition image data comprise one or more sets of reconstructed image data.

27. An imaging system, comprising,

an imager configured to generate a plurality of signals representative of one or more structures within a region of interest;

a sensor-based motion determination system configured to acquire one-dimensional motion data from one or more sensors;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to process the plurality of signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry; and

an operator workstation configured to communicate with the system control circuitry and to receive the processed plurality of signals from the data processing circuitry;

wherein at least one of the imager and the sensor-based motion determination system are configured to acquire a first, a second, and a third set of one-dimensional motion data for an organ along respective first, second, and third respective perpendicular axes; and

wherein at least one of the sensor-based motion determination system, the data processing circuitry, and the operator workstation are configured to derive one or more concurrent motion vectors from each of the first, second, and third sets of one-dimensional motion data and to combine the one or more concurrent motion vectors to generate a set of three-dimensional motion data for the organ.

28. The imaging system, as recited in claim 27, wherein at least one of the sensor-based motion determination system, the data processing circuitry, and the operator workstation is configured to validate one or more sets of one-dimensional motion data using one or more respective sets of validation motion data.

29. The imaging system, as recited in claim 27, wherein the one or more sensors comprise at least one of an accelerometer, an optical marker, a displacement sensor, a force sensor, an ultrasonic sensors, a strain gauge, a photodiode, and a pressure sensor.

30. The imaging system, as recited in claim 27, wherein at least one of the first, the second, and the third set of one-dimensional motion data is determined from a respective set of motion data acquired by the imager.

31. The imaging system, as recited in claim 30, wherein the respective set of motion data is a set of pre-acquisition image data.

32. The imaging system, as recited in claim 30, wherein the respective set of motion data is a set of acquisition image data.

33. The imaging system, as recited in claim 32, wherein the set of acquisition image data comprises a set of unreconstructed image data.

34. The imaging system, as recited in claim 32, wherein the set of acquisition image data comprises a set of reconstructed image data.

35. The imaging system, as recited in claim 27, wherein the first and second sets of one-dimensional motion data are acquired by the sensor-based motion determination system.

36. The imaging system, as recited in claim 27, wherein the first set of one-dimensional motion data is acquired by the sensor-based motion determination system.

37. The imaging system, as recited in claim 27, wherein the first, second, and third sets of one-dimensional motion data are acquired by the sensor-based motion determination system.

38. An imaging system, comprising,

an imager configured to generate a plurality of signals representative of one or more structures within a region of interest and to acquire at least one set of acquisition image data used to derive a first, a second, and a third set of one-dimensional motion data for an organ along respective first, second, and third respective perpendicular axes;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to process the plurality of signals;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry; and

an operator workstation configured to communicate with the system control circuitry and to receive the processed plurality of signals from the data processing circuitry; and

wherein at least one of the data processing circuitry and the operator workstation are configured to derive one or more concurrent motion vectors from each of the first, second, and third sets of one-dimensional motion data and to combine the one or more concurrent motion vectors to generate a set of three-dimensional motion data for the organ.

39. The imaging system, as recited in claim 38, wherein the at least one set of acquisition data comprises one or more sets of unreconstructed image data.

40. The imaging system, as recited in claim 38, wherein the at least one set of acquisition data comprises one or more sets of reconstructed image data.

41. The imaging system, as recited in claim 38, wherein at least one of the data processing circuitry and the operator workstation is configured to validate one or more sets of one-dimensional motion data using one or more respective sets of validation motion data.

42. An imaging system, comprising:

means for acquiring a first set of one-dimensional motion data for an organ along a first axis by a first methodology;

acquiring a second set of one-dimensional motion data for the organ along a second axis by a second methodology, wherein the first axis and the second axis are perpendicular;

acquiring a third set of one-dimensional motion data for the organ along a third axis by a third methodology, wherein the third axis is perpendicular to the first axis and the second axis;

deriving one or more concurrent motion vectors from each of the first, second, and third sets of one-dimensional motion data; and

combining the one or more concurrent motion vectors to generate a set of three-dimensional motion data for the organ.